What is claimed is:

1. A method of depositing a metal layer on a wafer, the method comprising:

immersing the wafer in an electrolytic solution containing metal ions; and

biasing the wafer negatively with respect to the electrolytic solution so as to create a current flow between the electrolytic solution and the wafer and thereby electroplate a metal layer on a surface of the wafer by first biasing the wafer to produce a first current density, then secondly biasing the wafer to produce a second current density, the second current density being greater than zero and less than the first current density.

2. The method as in claim 1, wherein the biasing the wafer further includes, after the secondly biasing, thirdly biasing the wafer to produce a third current density, the third current density being greater than the second current density.

3. The method as in claim 1, wherein the biasing the wafer further includes, after the secondly biasing, thirdly biasing the wafer to produce a third current density, the third current density being greater than the first current density.

4. The method as in claim 3, wherein the biasing the wafer negatively includes, after the thirdly biasing, further electroplating using a succession of steps of increasing current densities, the succession of steps beginning with a fourth step having a fourth current density being greater than the third current density.

5. The method as in claim 4, wherein a film deposition rate produced by the second current density is less than 0.01 times as great as an average film deposition rate during the thirdly biasing and the succession of steps.

6. The method as in claim 3, wherein the first biasing, the secondly biasing, and the thirdly biasing are carried out in-situ.

7. The method as in claim 3, wherein the first current density lies within a range of 0.003 to 0.08 amps/cm^2 and the third current density lies within a range of about 0.003 to 0.08 amps/cm^2.

8. The method as in claim 1, wherein the second current density is no greater than 0.0016 amps/cm^2.

9. The method as in claim 8, wherein the secondly biasing takes place for a time of 1 to 30 seconds.

10. The method as in claim 1, wherein the second current density produces a film deposition rate no greater than 45 Å/minute.

11. The method as in claim 1, wherein the first biasing takes place for a first time of 1 to 15 seconds and the secondly biasing takes place for a second time of 1 to 30 seconds.

12. The method as in claim 1, wherein the metal ions are copper ions and the metal layer comprises copper.

13. The method as in claim 1, wherein the surface includes an upper portion and an opening extending downwardly therefrom and the biasing the wafer negatively produces the metal layer substantially completely filling the opening.

14. The method as in claim 13, wherein the opening is a via that includes a width no greater than 0.25 microns.

15. The method as in claim 1, wherein the electrolytic solution is in a bath and includes a flow rate of 5-20 liters per minutes.

16. The method as in claim 1, wherein the electrolytic solution includes an accelerator having a concentration of about 1-16 milliliters/liter and a suppressor having a concentration of about 1-10 milliliters/liter.

17. The method as in claim 1, further comprising depositing a seed layer on the surface prior to the biasing.

18. A method of electrochemically depositing a metal layer on a wafer, the method comprising:

depositing a seed layer on a surface of the wafer;

electroplating the metal layer on the wafer by:

first immersing the wafer in a first electrolytic solution containing metal ions and first biasing the wafer negatively with respect to the first electrolytic solution so as to create a first current flow and a first current density;

then immersing the wafer in a second electrolytic solution that contains metal ions and secondly biasing the wafer negatively with respect to the second electrolytic solution so as to create a second current flow and a second current density, the second current density being greater than zero and less than the first current density; and

then immersing the wafer in a third electrolytic solution that contains metal ions and thirdly biasing the wafer negatively with respect to the third electrolytic solution so as to create a third current flow and a third current density, the third current density being greater than the second current density.

19. The method as in claim 18, wherein immersing the wafer in a second electrolytic solution takes place for a time of 1 to 30 seconds and includes the second current density being no greater than 0.0016 amps/cm^2.

20. The method as in claim 18, wherein the third current density is greater than the first current density.

21. A process recipe for electroplating a metal film onto a substrate by electrochemical deposition, comprising a first step with a first bias to create a first current density between the substrate and an electrolytic solution, a second step following the first step and having a second bias to create a second current density between the substrate and the electrolytic solution, the second current density being greater than zero and less than the first current density, and subsequent steps of continuously increasing current densities beginning with a third step that follows the second step and has a third bias that creates a third current density between the substrate and the electrolytic solution, the third current density being greater than the first current density.

22. The process recipe as in claim 21, wherein the second current density is no greater than 0.0016 amps/cm^2 and produces a deposition rate less than about 50 Å/minute.

23. The process recipe as in claim 21, wherein the second step includes a time of 1 to 30 seconds, the first current density lies within a range of 0.003 to 0.08 amps/cm^2 and the third current density lies within a range of about 0.003 to 0.08 amps/cm^2.